Q-Grad Control Options

Control of the Q-Grad pump is achieved using the four RS-232 ports (corresponding to pumps A, B, C, and D) on the rear panel. Various user-selectable pump control options are available, ranging from a compact keypad controller to a high-end software package for an entire HPLC system. A summary of the main features of each control option is presented below with a brief installation procedure. Refer to the appropriate manual for details.

(A) Keypad Controller

The LabAlliance SCU450 keypad controller (p/n WI-D2K1012601) provides quaternary gradient control for the Q-Grad, with maximum flow rate default setting of 5 mL/min.

SCU 450

The keypad has the capability to store 10 methods of approximately 100 lines each, it allows the user to link methods, and it is capable of external start by (TTL or contact closure) input from an injector, autosampler or external LC device. In addition, the keypad will allow the user to set pressure limits for the pump and will shut down all pumps when a pressure fault is detected. Priming of the pumps can also be done from the keypad.

The SCU450 kit contains 4 pump cables, an external start cable, a PC cable, power cable, and user manual. The PC cable would be used to link the SCU450 to the serial port of the PC to allow modifications of the firmware in the field. With the help of the 'SCU450 CC' program (provided on a CD), the user may make minor modifications to the firmware such as number of methods and the maximum flow rate capability – the latter feature is useful for control of other SSI pumps.

Installation Instructions:

1) Connect solvent lines from appropriate reservoirs to the individual pump heads using the 1/8" TFE tubing and fittings provided. Set up the remainder of the components of the HPLC system - the pump outlet line goes to the injector or autosampler; the fluid path then goes to the column, the post-column unit (if any), the detector, and finally to waste. For the initial priming, you may connect the

pump outlet directly to waste. Refer to the appropriate LC component manual for specific details.

2) Attach the SCU pump cables from the keypad to the appropriate RS-232 port at the back of each pump on the rear panel. Ensure that port A is connected to pump A, port B to pump B, etc.
3) (optional) Connect the external start cable of the SCU to the position sensing switch of a manual injector or to the 'inject start' function of an autosampler.
4) Connect the power cable of the SCU and ensure that the display is active. The current Status will show IDLE.
5) Scroll down the SCU display with the down arrow until the "Prime" commands for the individual pumps can be accessed. Press the number corresponding to a specific pump, as indicated on the display, in order to prime that pump head. Priming may be stopped at any time by pressing 'CL' or scrolling out of this screen.
6) To build a method table and access other user-defined parameters, press "MODE" to toggle between the Status screen and PARAMETER entry screen. A new 'time' value needs to be entered for each gradient step to be entered. Details of building a gradient method may be found in the SCU450 keypad manual.

(B) PC-based Software for Pump Control

Q-Grad with Software Control through MPX box

The LabAlliance PC-based software control option provides quaternary gradient control of the Q-Grad through a single serial port of a Windows PC ('95, 98, NT). The software for pump control is very user-friendly and intuitive; it allows the user to build an unlimited number of gradient methods and also provides 'direct control' of each pump. The Gradient Graphic Editor (GGE) tool present in the software allows the user to build gradients with a few clicks of the mouse. A Flow Calibration Wizard allows the user to apply corrections to the flow at each pump head to account for solvent compressibility effects. In addition, the capability for priming pumps, external start by TTL/contact closure, setting pressure limits, and modifying maximum flow rate setting is also provided with this software.

The pumps communicate with the PC via an MPX interface box; RS-232 cables link the pumps to the MPX interface and a single RS-232 cable (with DB-9 connector) links the MPX to the PC. The software package (p/n WI-QGS) includes 4 pump cables, MPX interface, PC cable, external start cable, power cable, software CD, hardware key for parallel port, and manual. The hardware key allows the user to move the program to different PCs; without the key attached, all features are still

active except for actual communication with the pumps, i.e., the program functions as a “demo”.

Installation Instructions:

1) Connect solvent lines from appropriate reservoirs to the individual pump heads using the 1/8” TFE tubing and fittings provided. Set up the remainder of the components of the HPLC system - the pump outlet line goes to the injector or autosampler; the fluid path then goes to the column, the post-column unit (if any), the detector, and finally to waste. For the initial priming, you may connect the pump outlet directly to waste. Refer to the appropriate LC component manual for specific details.
2) Connect the RS-232 cables between the MPX pump interface box and the pump; pump A to port A, pump B to port B, etc.
3) (optional) Connect the external start cable of the MPX box to the position sensing switch of a manual injector or to the ‘inject start’ function of an autosampler.
4) Turn off the PC. Connect the hardware key to the parallel port of the PC. Connect the serial cable from the ‘com’ port of the PC to the MPX-PC connection.
5) Turn on the PC and load the software.
6) Open the ‘LAGradControl’ program and under ‘System’ select ‘Solvent Delivery System’. Enter the COM port of the PC to which the MPX box is connected. Check mark the pumps being used and enter pressure limits, flow information; click ‘OK’ when complete; close and reopen program to accept the changes.
7) Priming may be done directly by clicking on the syringe icon that corresponds to each pump. Alternately, use ‘Direct Control’ to set a flow rate and independently run or prime each pump.
8) If solvents of widely varying compressibility are being used, the ‘Flow Calibration’ selection under ‘System’ will bring up a wizard that will help the user with entering newly calibrated flow values for the individual pumps. This will automatically adjust the flows associated with the specific pumps when running the gradient program.
9) A gradient method may be built by clicking the gradient table icon and entering the desired steps. Alternately, the graphic editor tool can be used to build a method by clicking the appropriate solvent bottle icon. See manual for details.

(C) Software Control Upgrade

Users who already have the SCU450 keypad control option and also wish to have the PC-based software control for the Q-Grad pump should order the upgrade kit (p/n WI-DY2K073105).

(D) HPLC System Control Option

Q-Grad pump control can also be performed through 'UNITY', the complete LabAlliance HPLC system control package for pumps, detectors, autosamplers, and data collection.

The Unity Control Panel allows efficient communication with pumps and other LC devices. The GUI pump control panel permits the user to quickly build a method, to set pressure limits, and to launch a pump control file directly into a method file. Three modes of pump operation are available from the interface panel – Isocratic, Gradient, and Dial-A-Mix. In gradient mode, a convenient drop-down gradient table may be used to edit a gradient method, even while the pumps and other components are in equilibration phase. Independent pump control using the 'Dial-A-Mix' mode allows for quick priming or flow control of a specific pump. A unique Configuration Wizard helps the user to configure in various pump, detector and autosampler devices to set up the System Configuration.

Communication with the pumps is via RS-232 cables connected to the (Pyramid) P1 interface box. The P1 box is an external hardware device to which various LC components are connected; communication between the P1 interface module and a serial port of the PC is established through a special cable with a DB9 connector.

The Unity package (SD-PC-UN) includes 4 pump cables, 2 detector/autosampler (digital) cables, 2 detector (analog) input cables, external start cable, P1 interface box with PC cable, software CD, Computer with Office 2000, and a monitor. The same Unity package without PC/monitor is p/n AC-950-150.

Installation Instructions:

1) Connect solvent lines from appropriate reservoirs to the individual pump heads using the 1/8" TFE tubing and fittings provided. Set up the remainder of the components of the HPLC system - the pump outlet line goes to the injector or autosampler; the fluid path then goes to the column, the post-column unit (if any), the detector, and finally to waste. For the initial priming, you may connect the pump outlet directly to waste. Refer to the appropriate LC component manual for specific details.
2) Connect the RS-232 cables between the Unity-P1 component interface box and the pump; pump A to port A, pump B to port B, etc.
3) (optional) Connect the external start (blue-green) cable between the 'S' connection at the input flags terminal and the position sensing switch of a manual injector (or to the 'inject start' function of an autosampler).
4) Turn the computer off and connect the host adapter cable from the P1 interface box (at the 'Host PC' connection) to the serial port of a PC using the Y-connector that is part of the kit.
5) Load the software on the PC.
6) Turn the pump on, power up the P1 box. Launch the 'LA Rack' program.
7) Under 'Setup' select the Configuration Wizard option that will guide the user through setup of the HPLC system – pump, detector, and autosampler. Close and

reopen the program to accept the changes. The program may take 1-2 minutes to communicate the information to the P1 module.

8) Under ‘Instruments’, select ‘Pump control’. Set upper pressure limit in this panel; select ‘Dial-A-Mix’ to allow entry of flow values for the individual pumps. Enter a flow of 3-5 mL/min to prime the individual pumps.
9) A gradient method may be set up using the ‘gradient’ mode in the pump panel. The edited method can be saved as a pump control file (‘pcf’) and launched into a method file later. See manual for details.